STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

BEVERLY EAVES PERDUE
GOVERNOR

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Memorandum

TO: Regional and Division Traffic Engineers

FROM: Brad Robinson, PE
Traffic Safety Engineer

SUBJECT: 2009 Standardized Crash Cost Estimates for North Carolina

The Traffic Engineering and Safety Systems Branch periodically updates cost figures associated with traffic crashes for use by branch personnel for cost analyses. Increases in medical care and other inflationary costs can quickly render previously developed cost estimates obsolete.

The 2009 North Carolina crash costs include the cost associated with the average number of injuries in each crash type. For example, the average fatal crash in 2009 on North Carolina's roads contained 1.09 fatal injuries, 0.16 A injuries, 0.40 B injuries and 0.29 C injuries. The injury costs include estimates of medical costs, public services, loss of productivity, employer cost, property damage and change in quality of life. Table 1 shows the comprehensive cost of crashes by severity.

Table 1 Comprehensive Cost Per Crash

Crash Type	Cost Per Crash 2009 Dollars
Fatal Crash	$4,400,000
A Injury Crash	$260,000
B Injury Crash	$76,000
C Injury Crash	$37,000
Property Damage only Crash	$5,000
Average Crash	$47,000
Non-Fatal Injury Crash	$54,000
Severe Injury Crash (F+A)	$1,900,000
Moderate Injury Crash (B+C)	$48,000

Note: All figures are rounded to two significant figures

Table 2 includes only the reportable crashes that occurred on public roads in 2009. Note that for various reasons, many traffic crashes are not reported. A traffic crash in North Carolina is defined as reportable if it involves an injury or total estimated property damage of $1,000 or more. A traffic crash is rated by the most severe injury involved in the incident. If a crash had eight people involved and seven people sustained C type injuries and one person sustained type A injuries, the crash is recorded as an A Injury crash. However, there were eight injuries. A property damage only crash is one in which no people were injured in the incident.

Table 2 Number of Crashes Compared to the Number of Injuries in North Carolina during 2009

	Number of Crashes	Number of Injuries
Fatal	1,236	1,346
A Injury	1,999	2,477
B Injury	18,223	24,186
C Injury	49,410	83,202
Property Damage Only	139,457	--

Source: North Carolina Crash Database

Table 3 shows the average number of each type of injury that occurred in each crash severity category. These numbers were derived by totaling all the individual injuries that occurred in a severity category. The total is then divided by the total number of crashes in that category. For example, there were **1,346 fatalities, 198 A injuries, 493 B injuries and 360 C injuries in 1,236 fatal crashes**. If the number of injuries is divided by the number of crashes, then there was an average of 1.09 fatalities, 0.16 A injuries, 0.40 B injuries and 0.29 C injuries in each fatal crash.

Table 3 Average Number of Injuries by Severity Category

Crash Type	Average Number of Fatal Injuries	Average Number of A Injuries	Average Number of B Injuries	Average Number of C Injuries
C Injury Crash	0	0	0	1.51
B Injury Crash	0	0	1.26	0.43
A Injury Crash	0	1.14	0.32	0.33
Fatal Crash	1.09	0.16	0.40	0.29

The cost per injury data was obtained from Dr. Ted Miller of The Children's Safety Network Economics and Insurance Resource Center, a nationally recognized expert in the field. Table 4 shows a breakdown of the cost for each injury type. The Monetary cost considers only the cost of medical costs, public services, loss of productivity, employer cost, travel delay and property damage. This cost is often considered “out of pocket” expenses. The comprehensive cost considers the pain and suffering associated with the injuries.

Table 4 Cost per Injury in North Carolina

	Fatal Injury	A Injury	B Injury	C Injury	Property Damage Only
Medical[a]	$29,677	$23,289	$5,099	$2,735	$218
Public Services[b]	$1,473	$363	$236	$154	$74
Victim Work Loss[c]	$1,385,959	$30,606	$9,395	$4,543	$497
Employer Costs[d]	$10,505	$1,564	$643	$355	$115
Travel Delay[e]	$646	$281	$271	$231	$332
Property Damage[f]	$13,759	$5,410	$4,597	$3,475	$3,115
MONETARY COST	$1,442,019	$61,513	$20,241	$11,493	$4,351
Quality of Life[g]	$2,588,308	$140,923	$31,607	$13,163	$690
COMPREHENSIVE COST	$4,030,327	$202,437	$51,848	$24,655	$5,041

a) **Medical** includes hospital, physician, rehabilitation, prescription and related cost.
b) **Public Service** include police, fire, ambulance and helicopter services.
c) **Victim Work Loss** includes wages, fringe benefits and household work.
d) **Employer Cost** values time, the extra work and distractions for supervisors and coworkers that injuries cause.
e) **Travel Delay** values the time lost in traffic jams caused by crashes.
f) **Property Damage** is the cost to repair or replace damaged vehicles and property.
g) **Quality of Life** values the pain, suffering and quality of life that the family loses because of a death or injury.

Source: Ted Miller, Dexter Taylor, Children's Safety Network, Economics and Data Analysis Resource Center, October 2011, PIRE, Calverton, MD.

The cost per crash is calculated by multiplying the cost per injury from Table 4 and the average number of injuries per crash from Table 3. Table 5 shows the computations for fatal crashes in 2009. The cost associated with a crash includes all costs associated with each injury involved. The example of the fatal crash shows that the average fatal crash included 1.09 fatalities, 0.16 A injuries, 0.40 B injuries and 0.29 C injuries. The same type of calculation was completed for A, B, and C injury Crashes. Table 6 shows the results of these calculations.

Table 5 Computation of Monetary and Comprehensive Cost Per Fatal Crash

Injury	Number of Injuries (1)	Monetary Cost (2)	Comprehensive Cost (3)	Monetary Crash Cost (1) X (2)	Comprehensive Crash Cost (1) X (3)
Fatal Injury	1.09	$1,442,019	$4,030,327	$1,570,354	$4,389,013
A Injury	0.16	$61,513	$202,437	$9,854	$32,429
B Injury	0.40	$20,241	$51,848	$8,073	$20,680
C Injury	0.29	$11,493	$24,655	$3,347	$7,181
Total				$1,591,628	$4,449,304
TOTAL (rounded to 2 significant figures)				**$1,600,000**	**$4,400,000**

Table 6 Monetary and Comprehensive Cost for Traffic Crashes In North Carolina

	Monetary 2009 Dollars	Comprehensive 2009 Dollars
Fatal Crash	$1,600,000	$4,400,000
A Injury Crash	$80,000	$260,000
B Injury Crash	$31,000	$76,000
C Injury Crash	$17,000	$37,000
Property Damage Only Crash	$4,400	$5,000
Average Crash	$20,000	$47,000
Non-Fatal Injury Crash	$23,000	$54,000
Severe Injury Crash (F+A)	$660,000	$1,900,000
Moderate Injury Crash (B+C)	$21,000	$48,000

The 2009 crash costs were also summarized between urban and rural categories. Rural crashes are usually more severe making the cost of an average rural crash higher than that of the average urban crash. Table 7 shows the number of crashes broken down by severity category and its respective percentage of total crashes. Notice that there are more severe crashes in rural areas, and a higher percentage of rural crashes fall within the more severe categories.

Table 7 Urban and Rural Crash Summary by Severity Category

	Rural		Urban	
Severity	Number of Crashes	% Of Total	Number of Crashes	% Of Total
K	836	0.99%	400	0.32%
A	1,257	1.50%	742	0.59%
B	9,208	10.96%	9,015	7.11%
C	17,810	21.19%	31,600	24.92%
PDO	54,927	65.36%	85,053	67.07%

Table 8 shows the 2009 crash costs for rural and urban areas. The 2009 combined (urban and rural) crash costs are also presented for comparison. The crash cost for each severity category is very similar across the board for urban, rural, and combined categories. There is little change because the number of injuries per crash for each severity category changes very little when looking at rural and urban crashes. The big difference comes in the average costs. The average rural crash costs are higher because severe crashes make up a higher percentage of the total rural crashes when compared to the urban crash costs.

Table 8 Monetary and Comprehensive Crash Costs for Urban and Rural Areas

	Combined		Rural		Urban	
	Monetary	**Comprehensive**	**Monetary**	**Comprehensive**	**Monetary**	**Comprehensive**
Fatal Crash	$1,600,000	$4,400,000	$1,600,000	$4,500,000	$1,600,000	$4,300,000
A Injury Crash	$80,000	$260,000	$81,000	$260,000	$80,000	$250,000
B Injury Crash	$31,000	$76,000	$30,000	$74,000	$31,000	$78,000
C Injury Crash	$17,000	$37,000	$17,000	$36,000	$18,000	$38,000
Property Damage Only Crash	$4,400	$5,000	$4,400	$5,000	$4,400	$5,000
Severe Injury Crash (F+A)	$660,000	$1,900,000	$690,000	$2,000,000	$590,000	$1,700,000
Moderate Injury Crash (B+C)	$21,000	$48,000	$21,000	$49,000	$21,000	$47,000
Average Crash	$20,000	$47,000	$27,000	$68,000	$15,000	$34,000
Non-Fatal Injury Crash	$23,000	$54,000	$24,000	$58,000	$22,000	$51,000

If you have any questions regarding 2009 crash costs, please contact Brad Robinson, PE at (919) 773-2966.

BDR/bdr